LANDSAT DATA CONTINUITY MISSION – LAUNCH FEVER

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ABSTRACT

The year 2013 will be an exciting period for those that study the Earth land surface from space, particularly those that observe and characterize land cover, land use, and the change of cover and use over time. Two new satellite observatories will be launched next year that will enhance capabilities for observing the global land surface. The United States plans to launch the Landsat Data Continuity Mission (LDCM) in January. That event will be followed later in the year by the European Space Agency (ESA) launch of the first Sentinel 2 satellite. Considered together, the two satellites will increase the frequency of opportunities for viewing the land surface at a scale where human impact and influence can be differentiated from natural change. Data from the two satellites will provide images for similar spectral bands and for comparable spatial resolutions with rigorous attention to calibration that will facilitate cross comparisons. This presentation will provide an overview of the LDCM satellite system and report its readiness for the January launch.

LDCM will be the eighth satellite in the Landsat series that began with the launch of Landsat 1 in 1972. The LDCM is being developed and will be operated through an interagency partnership between the National Aeronautic and Space Administration (NASA) and the United States Geological Survey (USGS) within the Department of Interior. NASA leads the building and launching of the satellite observatory with two Earth-observing sensors. USGS leads the development of the ground system and will lead satellite operations including collecting, archiving, and distributing LDCM data. The USGS intends to rename the satellite observatory "Landsat 8" following launch.

The LDCM observatory is currently in the integration and test phase. Orbital Sciences Corporation built the spacecraft bus under contract to NASA at facilities in Gilbert, Arizona, USA. Two instruments have been shipped to the Gilbert facility for integration onto the spacecraft optical deck. Ball Aerospace

& Technology Corporation built one sensor, the Operational Land Imager (OLI), under contract to NASA and shipped OLI to Gilbert in October 2011. NASA Goddard Space Flight Center (GSFC) built the other instrument, the Thermal Infrared Sensor (TIRS), and shipped it to Gilbert in February 2012. The integrated observatory will be subject to comprehensive performance and environmental testing before sending it to Vandenberg Air Force Base in California, USA in September 2012 for integration onto the launch vehicle and launch. NASA selected the United Launch Alliance Atlas V 401 for the LDCM launch vehicle. The window for launch is January 15 to February 15, 2013.

The LDCM satellite will be placed in a 716 km near-circular, near polar, sun-synchronous orbit (705 km altitude at the equator). The observatory will have a 16-day ground track repeat cycle with an equatorial crossing at 10:00 a.m. (+/- 15 minutes) mean local time during the descending node of each orbit. In this orbit, the LDCM will follow a sequence of fixed ground tracks (also known as paths) defined by the second Worldwide Reference System (WRS-2). The LDCM observatory will likely be placed in the current Landsat 5 orbit providing an eight day offset between an overpass of Landsat 7 and an overpass of LDCM for any particular ground track [1].

In orbit, OLI and TIRS will simultaneously observe coincident areas during Earth observing operations. OLI will collect image data for nine shortwave spectral bands over a 185 km swath with a 30 m spatial resolution for all bands except a 15 m panchromatic band. TIRS will collect image data for two thermal bands with a 100 m resolution over the same 185 km swath. Both sensors are pushbroom multispectral radiometers that offer technical and performance advantages over earlier Landsat instruments.

The LDCM satellite will transmit OLI and TIRS data to ground receiving stations that will in turn pass data along to the USGS Earth Resources Observation and Science Center (EROS). EROS will archive the data and generate Level 1 data products containing well calibrated and co-registered OLI and TIRS data. These data products will be made available for free distribution to the general public in accordance with the current USGS Landsat data policy. The LDCM will thus ensure Landsat data continuity and will expand the 40-year archive of critical land surface observations for at least five years.

REFERENCES

[1] J.R. Irons, J.L. Dwyer, and J.A. Barsi, "The Next Landsat Satellite: The Landsat Data Continuity Mission," *Photogrammetric Engineering & Remote Sensing*, in press, 2012.